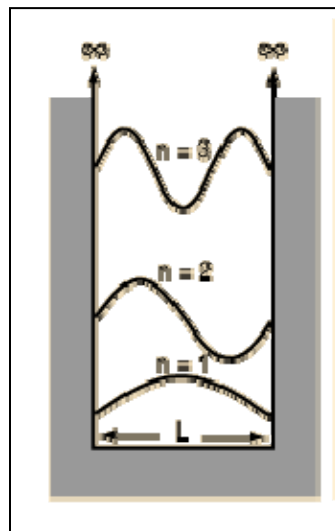


Particle in a Box Lab

Directions. In the Physical Chemistry lab, using the iMac computer, go to the Mathcad Programs folder. Start the One-Dimensional PIB program.

Solve the particle in a box for the first four energy levels (i.e. $n = 1, 2, 3, 4$) for each of the following sets of conditions outlined in the table below. One needs to vary the value corresponding to the 'Make Energy Guess' option in the software. Various guesses for the energy give rise to different wavefunctions 'in the box'. You need to generate real and appropriate wavefunctions for a particle in a box by iterating to a desired energy.



	Mass	Width (L)	Potential
a	$\mu = 1$	$x_{\max} = 1$	$V_0 = 0$
b	$\mu = 1$	$x_{\max} = 2$	$V_0 = 0$
c	$\mu = 2$	$x_{\max} = 1$	$V_0 = 0$
d	$\mu = 1$	$x_{\max} = 1$	$V_0 = 1$

Never save changes to a file.
Hit cancel or do not save

In your report, be sure to include all print-outs (data) for the wavefunctions generated.

Questions.

1. Explain how mass affects the solutions to the particle in a box.
2. Explain how length of the box affects the solutions to the particle in a box.
3. Explain how having a nonzero potential inside the box affects the solutions to the particle in a box.
4. How do the solutions for the particle in a box compare with those in your textbook?
5. Using the results from (a) derive an expression for the spacing of the energy levels for the particle in a box.
6. What is the Bohr correspondence principle?